MERCK PHARMACEUTICAL MANUFACTURING DIVISION
DIVISION OF MERCK & CO., INC.
WEST POINT, PENNSYLVANIA 19486

ORIGINAL

May 13, 1991

Mr. Tim Malloy
Office of Regional Council

Ms. Kathy Davies
Hydrogeologist

and

Ms. Humane Zia
Remedial Project Manager

United Stated Environmental
Protection Agency, Region III
841 Chestnut Building
Philadelphia, PA 19107

Dear Ms. Zia, Ms. Davies, and Mr. Malloy:

RE: MEETING SUMMARY
DOCKET NO. RCRA-III-002TH

Attached please find a meeting summary prepared by our hydrogeologist, Dr. Walt Ebaugh of Nittany Geoscience, Inc. The summary contains a copy of the set of illustrations used at the meeting, keynotes that accompany each illustration, and a summary of TCE results from soil sampling at the nineteen Potential Source Areas at the West Point site.

Our meeting allowed Merck to present information on groundwater conditions at and nearby our West Point facility. Two main were points made: Merck's groundwater problem is separate from the NPWA Zone 7 Superfund problem, and Merck is addressing its groundwater problem aggressively. We believe the results of our work demonstrate these points.

Please contact me at (215) 661-3367 should you have any further questions about this matter.

Mark A. Lielke

Mark A. Lielke
Work Plan Coordinator
Site Environmental Services

MAL288/mlf

Attachment

P292078221, P292078222, P292078223

cc: Joel Hennessy (3HW61) P292078224
Yolaanda Ruffin (3HW61) P292078225
(Enclosure attch'd)

NITTANY GEOSCIENCE INC. MEMORANDUM

ORIGINAL

TO: EPA Region III
FROM: Merck & Co., Inc.
DATE: May 8, 1991
SUBJECT: Presentation Outline and Summary of Points, RCRA 7003 Environmental Site Investigation, West Point Site, Pennsylvania

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This memo summarizes the points presented by Merck in a meeting on March 19, 1991, with EPA representatives from both the RCRA and Superfund programs. Attendees and their affiliations were as follows:

EPA Superfund Program		
Tim Malloy	Office of Regional Council	(215) 597-8462
Kathy Davies	Hydrogeologist	(215) 597-6488
Humane Zia	RPM	(215) 597-7713
EPA RCRA Program		
Joel Hennessy	Hydrogeologist	(215) 597-7584
Yolaanda Ruffin	Project Coordinator	(215) 597-0568
Merck		
Ed Urban	Site Envi. Services	(215) 661-5195
Beryl Kuder	Legal	(908) 594-7710
Mark Stannard	Site Envi. Services	(215) 661-3704
Mark Lielke	Site Envi. Services	(215) 661-3367
Walt Ebaugh	Nittany Geoscience, Inc.	(814) 231-2170

EPA Superfund personnel were interested in the occurance of TCE at the Merck Site. The attached tables summarize the results obtained during soil sampling at the 19 Potential Source Areas (PSAs) at the West Point Site. Table 1 provides a summary of potential sources of TCE identified at the West Point Site (from Appendix C of the Detailed Work Plan). Analytical results for TCE in soil samples collected at each of the PSAs are presented on Table 2. The locations of the Potential Source Areas (PSAs) are given on the map presented as transparancy number 17 of the presentation (attached).

The source of the TCE plume in the regional aquifer is located in the industrial area to the east of the West Point Site. A revised map of the distribution of TCE in

the regional aquifer based upon the water sample data from December 1990 is enclosed as *December 1990 TCE Isoconcentration Map II*. The plume pattern reflects the combined effects of the southerly regional groundwater gradient, the southwesterly direction of principal aquifer hydraulic conductivity, and the stress on the aquifer created by pumping of Merck production wells.

TABLE 1

Summary of potential sources of subsurface Trichloroethene (TCE) contamination,
Merck & Co., Inc., West Point, PA

Background	*TCE was used by Merck in Building 28 until 1976. The site's previous owner may have used TCE in what is now Building 1.*
Sludge Lagoons	Drums which may have contained TCE were reportedly dumped into the lagoons between 1973 and 1977.
Storm Sewer	Groundwater contaminated from the sludge lagoons infiltrates into the stormwater sewer which transmits stormwater through the lagoon area to Detention Basin 4.
Waste-Oil Storage	Waste oil which may have contained TCE was stored in an underground tank north of Building 2.
Oiled Road	Waste oil from the above-mentioned storage tank was occasionally sprayed on a former dirt road parallel to the railroad tracks and leading to Building 68.
Building 28	TCE was used in Building 28 from 1952 to 1976. Used TCE was temporarily stored in drums next to the building in the paved cul-de-sac. A few minor spills from the drums were reported between 1970 and 1976.

SOURCE

"Site History of the West Point Site",
Appendix C of the Detailed Work Plan

TABLE 2
Trichloroethene (TCE) in soils, Potential Source Areas, Merck & Co., Inc., West Point, PA
(Concentrations in µg/Kg)

POTENTIAL SOURCE AREAS

1. Building 20

1.a. Chloroform Tanks and Delivery Valves

	SB1a-1			SB1a-2			SB1a-3			SB1a-4			SB1a-5		SB1a-6		Boring Number
	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S3	S1	S2	S1	S2	Sample Interval
	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	Analytical Result

1.b. Utilities Trench

	SB1b-1			SB1b-2		SB1b-3			SB1b-4			SB1b-5		SB1b-6		
	S1	S2	S3	S1	S2	S1	S2	S3	S1	S2	S3	S1	S2	S1	S2	S3
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

1.c. Industrial Sewer

	SB1c-1		SB1c-2		SB1c-3			SB1c-4		SB1c-5			SB1c-6		
	S1	S2	S1	S2	S1	S2	S3	S1	S2	S1	S2	S3	S1	S2	S3
	<2	<2	<3	<2	<2	173	2	<2	<2	<200	<2	9	<2	<2	<2

2. Building 69

2.a. Chloroform Transfer Station

	SB2a-1		SB2a-2			SB2a-3		SB2a-4			SB2a-5		SB2a-6	
	S1	S2	S1	S2	S3	S1	S2	S1	S2	S3	S1	S2	S1	S2
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

2.b. Sludge Tank

	SB2b-1	SB2b-2	SB2b-3		
	S1	S1	S1	S2	S3
	<1	<1	<1	<1	<1

3. Detention Basin 2

	SB3-1	SB3-2		SB3-3	SB3-4		SB3-5	SB3-6	
	S1	S1	S2	S1	S1	S2	S1	S-1	S2
	<1	<1	<1	<1	<1	<1	<1	<1	<1

4. Waste Treatment

4.a. Sludge Lagoons

	SB4a-1		SB4a-2		SB4a-3		SB4a-4		SB4a-5		SB4a-6
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S3	S1
	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

4.b Storm Sewer

	SB4b-1			SB4b-2			SB4b-3		SB4b-4		SB4b-5			SB4b-6		
	S1	S2	S3	S1	S2	S3	S1	S2	S1	S2	S1	S2	S3	S1	S2	S3
	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	621	<200	<2	<5	<2	6

5. Drum Collection Area

	SB5-1			SB5-2		SB5-3		SB5-4		SB5-5			SB5-6		
	S1	S2	S3	S1	S2	S1	S2	S1	S2	S1	S2	S3	S1	S2	S3
	<2	<200	<2	<2	<2	<2	13	<2	<2	2	<2	248	<2	<2	<2

6. Building 9

	SB6-1		SB6-2			SB6-3	
	S1	S2	S1	S2	S3	S1	S2
	<2	<2	2	<2	<2	<2	<2

TABLE 2 (cont.)

7. Waste Oil

7.a. Waste Oil Storage Tank

SB7a-1		SB7a-2		SB7a-3			SB7a-4		SB7a-5	SB7a-6	
S1	S2	S1	S2	S1	S2	S3	S1	S2	S1	S1	S2
<2	<2	<2	<2	<2	<2	<2	<2	<2	94	<2	<2

7.b. Oiled Road

SB7b-1			SB7b-2			SB7b-3		SB7b-4			SB7b-5			SB7b-6		
S1	S2	S3	S1	S2	S3	S1	S2	S1	S2	S3	S1	S2	S3	S1	S2	S3
<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

8. Coolant-Oil Drainage Field

SB8-1	SB8-2			SB8-3			SB8-4		
S1	S1	S2	S3	S1	S2	S3	S1	S2	S3
<2	<2	<2	<2	<2	<2	<2	<2	<2	<2

9. Building 28

SB9-1		SB9-2		SB9-3
S1	S2	S1	S2	S1
2	<2	<2	<2	<2

10. Drum Storage Areas

10.a. Building 20 Area

SB10a-1		SB10a-2		SB10a-3		SB10a-4			SB10a-5		SB10a-6		SB10a-7			SB10a-8	
S1	S2	S1	S2	S1	S2	S1	S2	S3	S1	S2	S1	S2	S1	S2	S3	S1	S2
239	<4	<2	<2	3	<2	<2	<2	<2	14	<2	<2	<2	13	46	2	<2	<2

10.b Building 68 Area

SB10b-1			SB10b-2			SB10b-3	
S1	S2	S3	S1	S2	S3	S1	S2
<2	<2	<2	<2	<2	<2	<2	<2

10.c Parking Lot C Area

SB10c-1			SB10c-2			SB10c-3		
S1	S2	S3	S1	S2	S3	S1	S2	S3
<2	<2	<2	<2	<2	<2	<2	<2	<2

12. Water Quality Patterns

12.a. Well N22 Region

SB12a-1			SB12a-2			SB12a-3			SB12a-4	
2-4'	6-8'	10-12'	2-4'	6-8'	10-12'	2-4'	6-8'	10-12'	2-4'	6-8'
<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

12.b. Well N31 Region

SB12b-1				SB12b-2			SB12b-3		SB12b-4		
2-4'	6-8'	10-12'	14-16'	2-4'	6-8'	10-12'	2-4'	6-8'	2-4'	6-8'	10-12'
<5	<5	<5	<5	<5	<5	<5	<5	<5	<20	<20	<20

NOTES

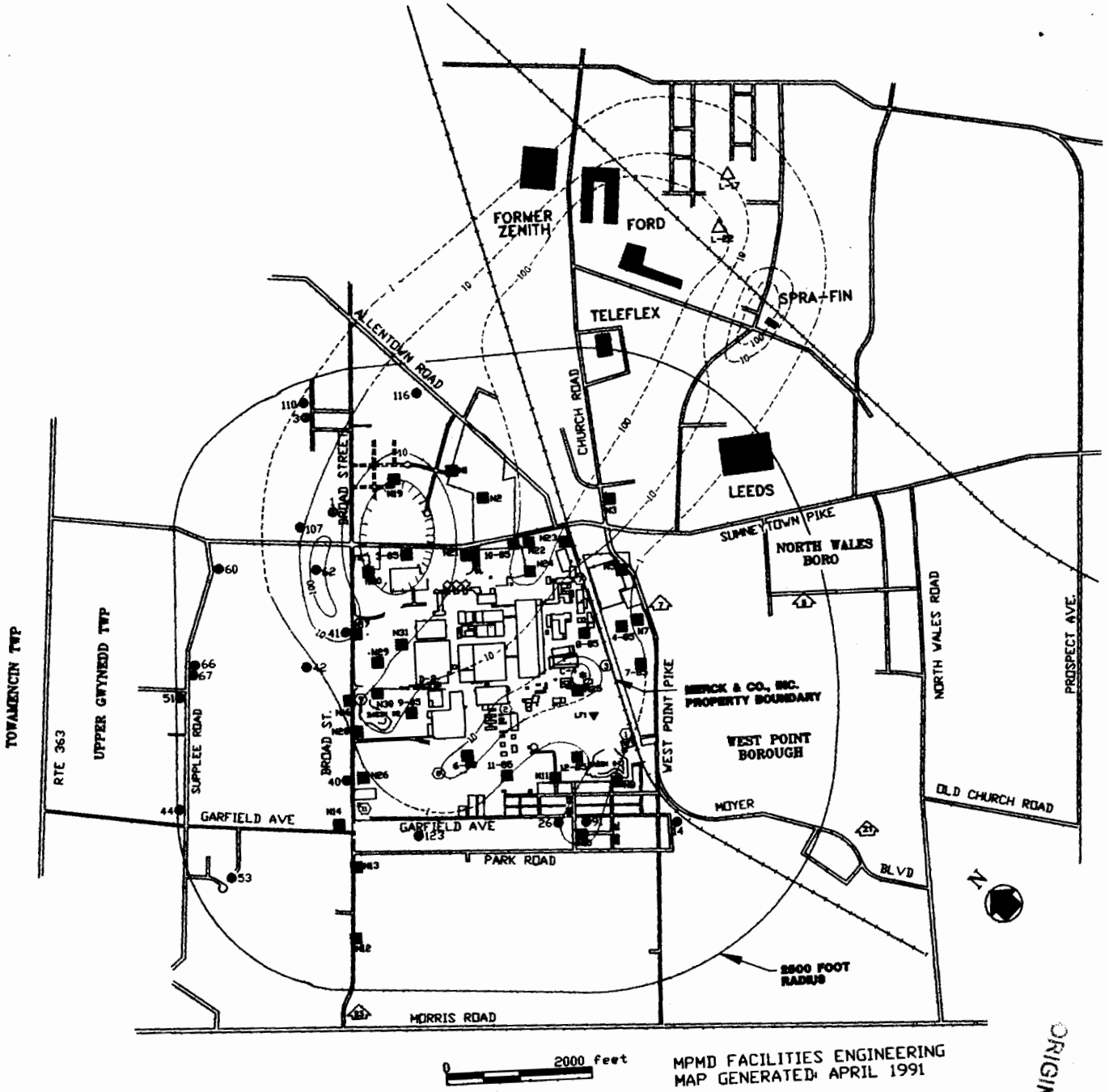
1) Detection limits vary depending on percent solids, sample weight, and extract dilution factor.
2) Reported values are dry weight results
3) Sampling intervals as follows:
   - S1 2.0-3.5 feet below ground surface
   - S2 5.5-7.0 feet below ground surface
   - S3 9.0-10.5 feet below ground surface

DECEMBER 1990
TCE ISOCONCENTRATION MAP II
MERCK & CO., INC.
WEST POINT PLANTSITE

NOTE: DATA EAST OF ALLENTOWN RD. AND NORTH OF SUMNEYTOWN PIKE IS FOR WELLS SAMPLED BETWEEN MARCH 1984 AND DECEMBER 1989. DATA GATHERED FROM NON-MERCK SOURCES.

LEGEND

- — 10 — LOGARITHMIC ISOCONCENTRATION CONTOUR, IN ppb
- IN SITU VOLATILIZATION VENTS
- MONITORING WELLS FOR CLOSED LANDFILL
- MERCK PRODUCTION WELLS
- NORTH WALES WATER AUTHORITY (NWWA) WELLS
- NORTH PENN WATER AUTHORITY (NPWA) WELLS (L-17 & L-22 ARE EPA DESIGNATIONS)
- DOMESTIC SUPPLY WELLS
- PERIMETER MONIT. WELLS



MPMD FACILITIES ENGINEERING
MAP GENERATED: APRIL 1991

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PRESENTATION SUMMARY

Merck's presentation was illustrated using overhead transparancies. The following lists the illustrations numbered sequentially, and summarizes the points made with reference to each. A copy of each illustration is attached to this memorandum.

1. This presentation has **two main points:**
   - Merck's groundwater problem is separate from the NPWA Zone 7 Superfund problem.
   - Merck is addressing its groundwater problem aggressively.
2. The **basis for separating Merck** from the NPWA Zone 7 Superfund problem is twofold:
   - A groundwater divide separates Merck from NPWA wells L-22 and L-17.
   - Contaminated groundwater from beneath the Merck site does not extend to the vicinity of NPWA wells L-22 and L-17.
3. **Merck's aggressive approach** to its groundwater problem is reflected in the following summary of facts:

   A. **Staff**
   - Environmental management of Consent Order activities - 13
   - In-house environmental laboratory - 12

   B. **Monitoring Wells**

Well Type	On-Site	Off-Site	Total
Pumping wells	7	0	7
100-ft monitoring wells	21 + 1	13 + 2	34 + 3
300-ft monitoring wells	7	1	8
Domestic wells	0	17	17
Municipal wells	0	4	4
	39 + 1	31 + 2	70 + 3

Note that 3 in the above list additional wells are planned for 1991.

C. **Financial Investment**

1991 Budget	1990	1989	1988	Total
$5.1M Env. Mgmt. $1.0M Lab $6.1M	$5.6M	$4.9M	$4.8M	$21.4M

D. **Public Water Connections** - 54 total at $1.0M cost

E. **Interim Remediation** - Chloroform capture (pounds) - Jan. 1988 through Feb. 1991

In-Situ Volatilization	17,203
Groundwater Pumping and Treatment	7,066
Total	24,269 pounds

F. **Shallow Piezometer Installations** - 46 shallow nests and 2 deep nests, with 1 additional planned for 1991

G. **Soil Gas Sample Locations** - 660 in 19 of 20 PSAs

H. **Soil Boring Sample Locations** - 95 in 19 of 20 PSAs

4. Site Location on Topographic Map

   - NPWA wells L-22 and L-17 are 5000 feet distant from Merck.

5. Site Location on Drainage Map

   - Regional surface-water drainage is to the south from Merck, via Skippack Creek and Wissahickon Creek to the Schuylkill River.

6. Site Drainage Map

   - Local drainage is to the west, south, and east, but ultimately to the south.
   - Groundwater drains to the south, following the general gradient of the land surface.

7. Regional Geologic Map

   - Merck is at the boundary between the Brunswick and Lockatong Formations.
   - Both rock formations are shale, siltstone, and fine-grained sandstone, differing mainly in color. Brunswick is red, and Lockatong is gray.
   - These rocks are hydraulically "tight", and depend largely upon fractures to store and transmit groundwater.
   - Rock beds are slightly tilted, and thus strike northeast, and dip 10 degrees to the northwest.
   - Groundwater can move most easily from northeast to southwest through the rock fractures which parallel the strike, or hinge line about which the rocks have been tilted. Additionally, groundwater moves more readily along the planes which separate the rock beds than across the beds themselves, and thus tends to flow more easily along a northeast to southwest trend.
   - Devoid of pumping stress, the groundwater hydraulic gradient drives flow to the south. The northeast-to-southwest direction of maximum

hydraulic conductivity skews flow through the rock toward the southwest.

- NPWA wells L-22 and L-17 are more than one mile northeast and are hydraulically upgradient from all but the easternmost corner of the Merck site.

8. Site Geologic Map

   - Detailed map data are compiled from many site borings.
   - Rock consists of bands of red and gray shale, siltstone, and fine-grained sandstone.
   - Joint (systematic fracture) frequency is greatest in northeast-southwest direction.

9. Site Geologic Cross Sections

   - Rocks dip northwest at about 10 degrees.

10. Schematic of Typical Monitoring Well Construction

    - High-quality sampling points, per TEGD and SW-846 specifications.
    - Stainless steel construction.
    - Dedicated bladder pumps.

11. Schematic of Typical Monitoring Well Conversion

    - Early wells retrofitted to meet RCRA standards.
    - All monitoring wells are high quality.

12. Schematic of Nested Piezometers

    - For sampling head (water level) and water quality in perched groundwater zones.
    - For assessing water quality in potential source areas.

13. Quarterly Groundwater Monitoring Locations

    - Seven pumping site production wells
    - Thirty four 100-foot monitoring wells
    - Eight 300-foot monitoring wells
    - Seventeen domestic wells
    - Four municipal wells

14. Groundwater Level Contour Map,
    December 1990

    - Groundwater level data demonstrate that a divide, which persists through time, exists between the composite cone of depression created in the water-level surface by pumping NPWA wells and that created by pumping Merck wells. The Merck site well field has been operated since 1948.
    - Because of the southwesterly regional flow of groundwater, and the groundwater divide existing between the NPWA wells and the Merck site, there is no threat of contamination to the NPWA wells from the Merck site.
    - Water derived from pumping NPWA wells L-22 and L-17 does not come from beneath the Merck site.

15. TCE Isoconcentration Map,
    December 1990

    - TCE sources apparently exist in the industrial area between Merck and the NPWA wells.
    - During periods when NPWA wells are not pumping, TCE would travel to Merck from sources northeast of Merck by the natural southwesterly flow of groundwater, augmented by the effect of Merck's pumping wells. Despite NPWA well pumping, TCE may flow toward Merck from sources located south of the divide.
    - Merck has used TCE in limited quantities. Some releases appear to have occurred, however the Merck pumping wells are the sink for site contaminants.

16. Chloroform Isoconcentration Map,
    December 1990

    - Merck used chloroform in large quantities between 1967 and 1982.
    - Four areas having chloroform concentrations in groundwater samples in excess of 1000 ppb occur across the middle portion of the site from east to west:
        - At location of former sludge lagoons
        - At Building 20, where chloroform was used in great quantity
        - At Building 69, where chloroform was used in great quantity
        - At Detention Basin 2, to which a spill of chloroform drained
    - The pattern of chloroform in site groundwater has been essentially stable over three years of monthly and quarterly monitoring.

- Two pumping wells have been added to assure the plume of site contamination remains under hydrodynamic control, and that Merck wells are the sink for the plume.

17. Potential Source Area Location Map

    - Potential source areas have been identified by groundwater plume hot spots, and an extensive review of site history.
    - Potential source areas are being systematically evaluated by a **three-media** sampling program:
        - Soil-gas survey, used to guide soil boring locations
        - Soil sampling
        - Shallow groundwater sampling
    - Three-media sample data are used for **verification** of potential source areas.

18. Soil Sampling Locations Per Soil Gas Isoconcentration Map

    - Soil-gas survey data are contoured for an isoconcentration map.
    - Soil borings are sited within regions of elevated contaminant concentration in soil atmosphere.

19. Perched Water Zones as Sampling Locations

    - Uppermost groundwater is sampled to assess its quality as part of a potential source area verification.
    - Head, or water-level, measurements describe the extent and variability of perched groundwater zones at potential source areas.

20. Summary of two main points:

    - Merck's groundwater problem is separate from the NPWA Zone 7 Superfund problem. Because of the southwesterly regional flow of groundwater, and the groundwater divide that exists, there is no threat to the NPWA wells from Merck's groundwater problem.
    - Merck is addressing its groundwater problem aggressively.

Merck is carrying out its site investigation under the Consent Order in accord with RCRA Corrective Action guidance and standards. The following two pages summarize the elements of the RCRA 7003 investigation, and the extent to which the structure of the investigation adheres to RCRA Corrective Action guidance.

WEST POINT SITE INVESTIGATION PER RFI GUIDANCE

1.0 ENVIRONMENTAL SETTING CHARACTERIZATION

- 1.1 Hydrology
- 1.2 Geology
  - 1.2.1 Lithology
  - 1.2.2 Structure
- 1.3 Fracture traces
- 1.4 Aquifer characteristics
  - Slug tests
  - Pumping tests

2.0 SOURCE CHARACTERIZATION

- 2.1 Site History
- 2.2 Regional Groundwater Quality
- 2.3 Source Verification
  - 2.3.1 Soil-gas Survey
  - 2.3.2 Soil Sampling
  - 2.3.3 Shallow Groundwater Sampling

3.0 CONTAMINATION CHARACTERIZATION

- 3.1 Nature
  - 3.1.1 Chloroform and TCE
  - 3.1.2 Other Constituents
- 3.2 Extent
  - 3.2.1 Lateral -- Isoconcentration Maps
  - 3.2.2 Vertical -- Well Clusters at 100 ft and 300 ft

4.0 POTENTIAL RECEPTOR IDENTIFICATION

4.1 Domestic Well Users -- Hookups to public supply

4.2 Municipal Wells -- NWWA 21, 23, 7

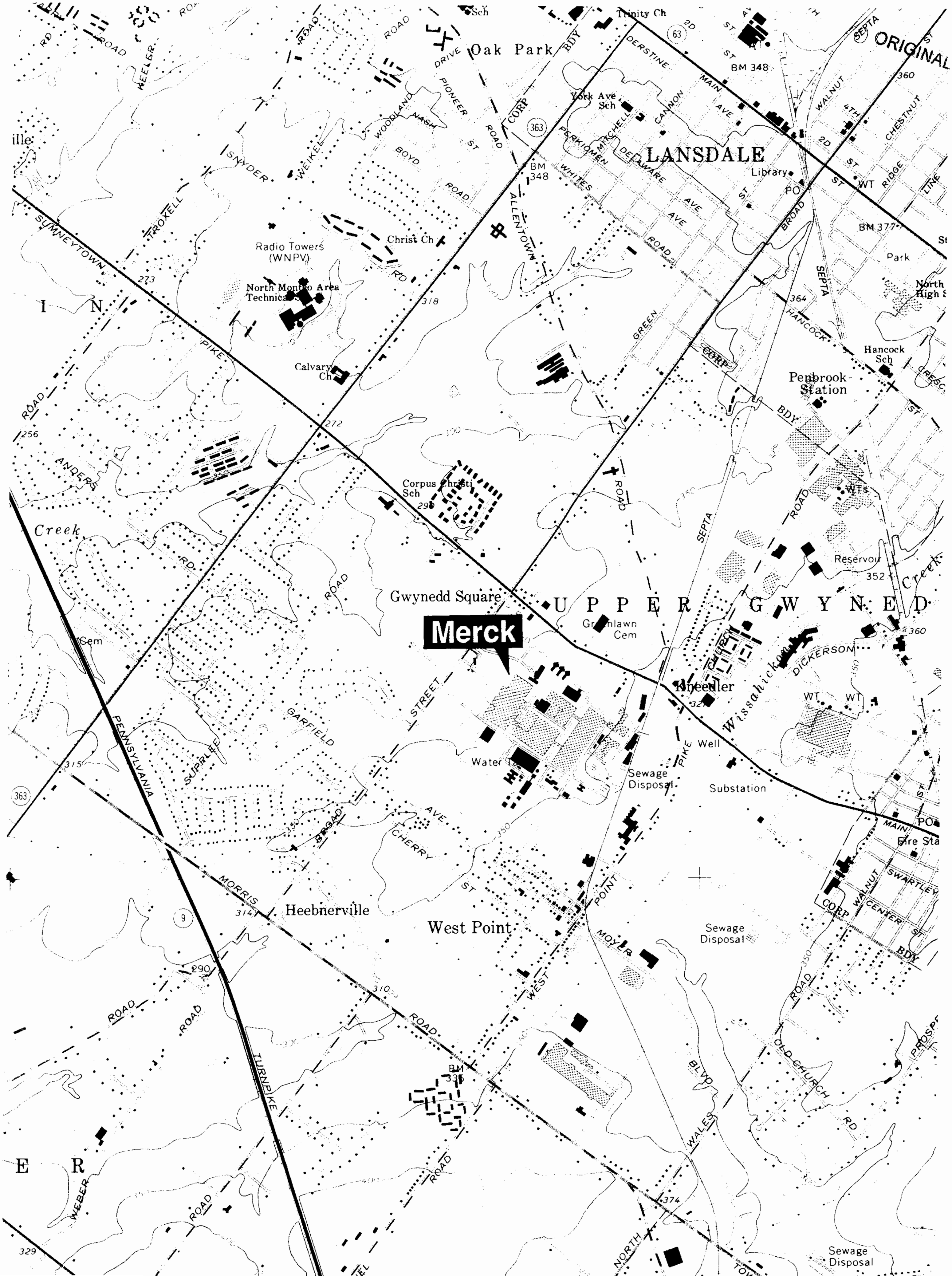
5.0 INTERIM MEASURES

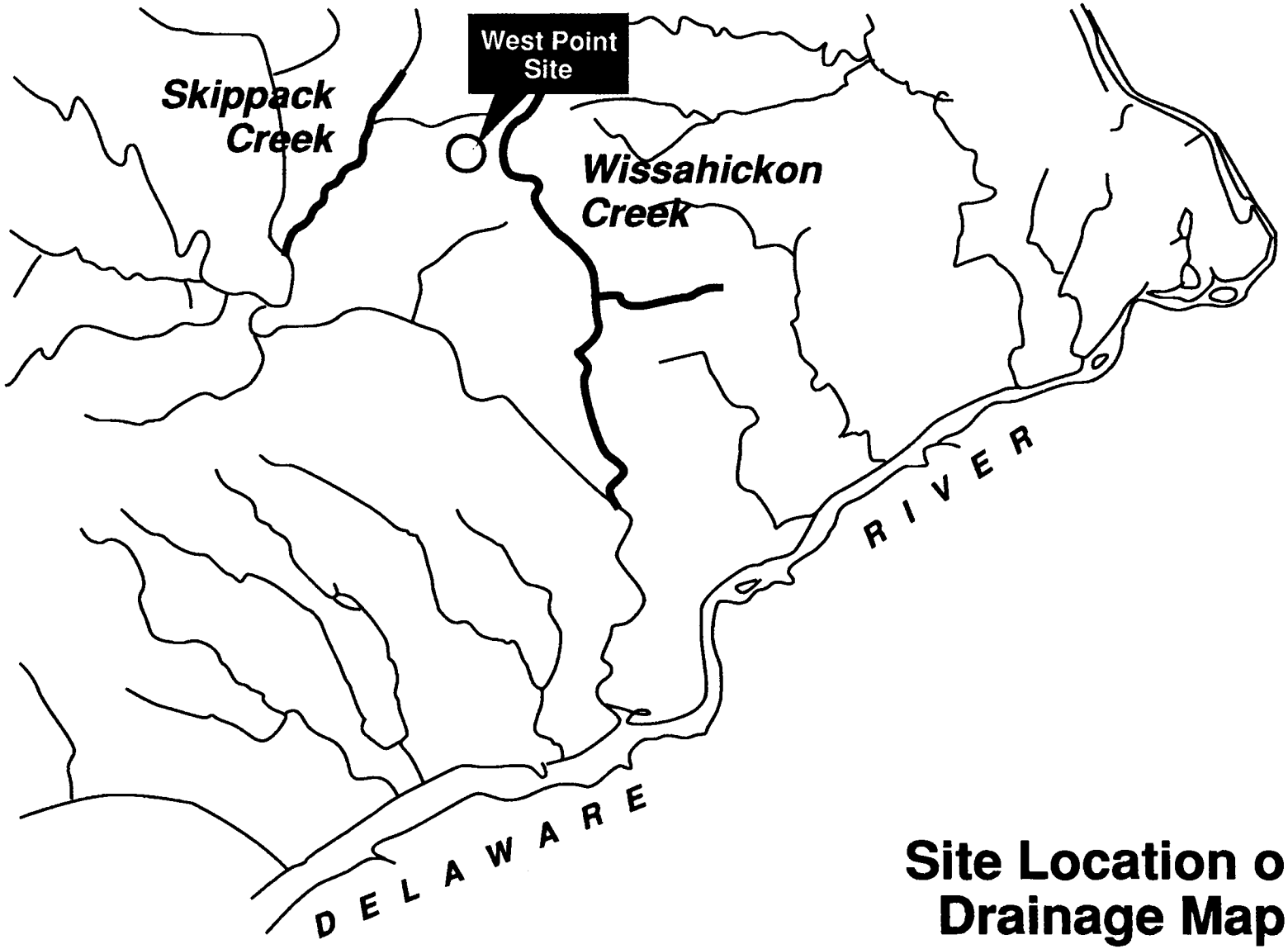
5.1 Domestic Well Hookups

5.2 Carbon Treatment

5.3 Hydraulic Barrier

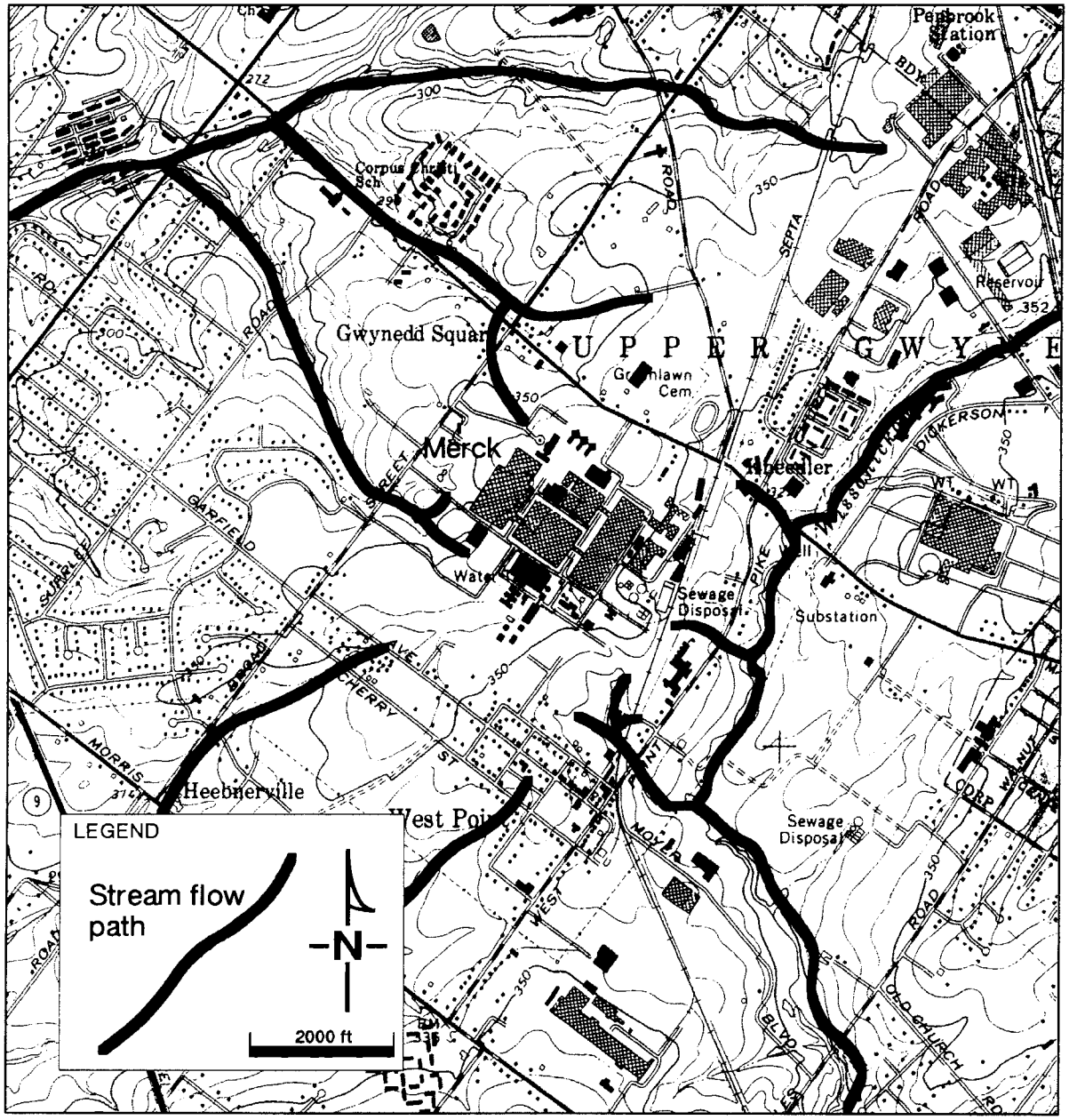
5.4 In-Situ Volatilization


Merck
LANSDALE
Oak Park
ORIGINAL
UPPER GWYNEDD
Gwynedd Square
West Point
Heebnerville
Kneedler
Penbrook Station
Radio Towers (WNPV)
North Montco Area Technical
Calvary Ch
Christ Ch
Corpus Christi Sch
Trinity Ch
York Ave Sch
Library
PO
Park
North High S
Hancock Sch
Reservoir
Grandlawn Cem
Cem
Water Tank
Well
Sewage Disposal
Substation
Fire Sta
Creek
Wissahickon Creek
SUMNEYTOWN PIKE
PENNSYLVANIA TURNPIKE
MORRIS ROAD
ALLENTOWN ROAD
BROAD ST
MAIN ST
GARFIELD
SUPPLEE
TROXELL
SNYDER
WEIKEL
WOODLAND
BOYD ROAD
PIONEER ROAD
DERSTINE
CANNON
MITCHELL
PERKIOMEN
WHITES ROAD
DELAWARE AVE
HANCOCK
DICKERSON
CHERRY ST
WEST POINT PIKE
MOYER
WALES BLVD
NORTH WALES
OLD CHURCH RD
SWARTLEY
CENTER ST
WALNUT
CHESTNUT
SEPTA
GREEN
ANDERS
WEBER ROAD
BM 348
BM 377
BM 335

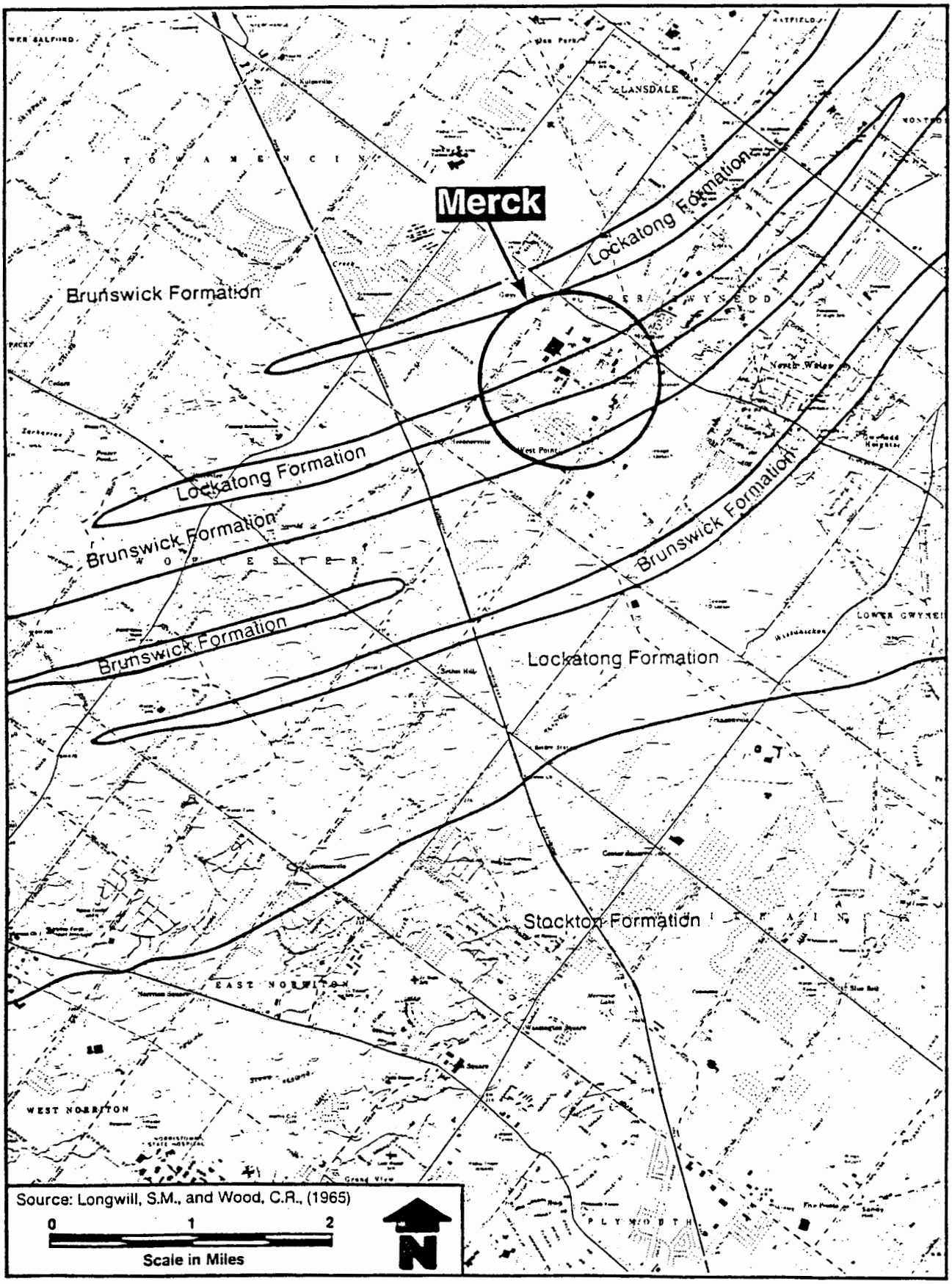


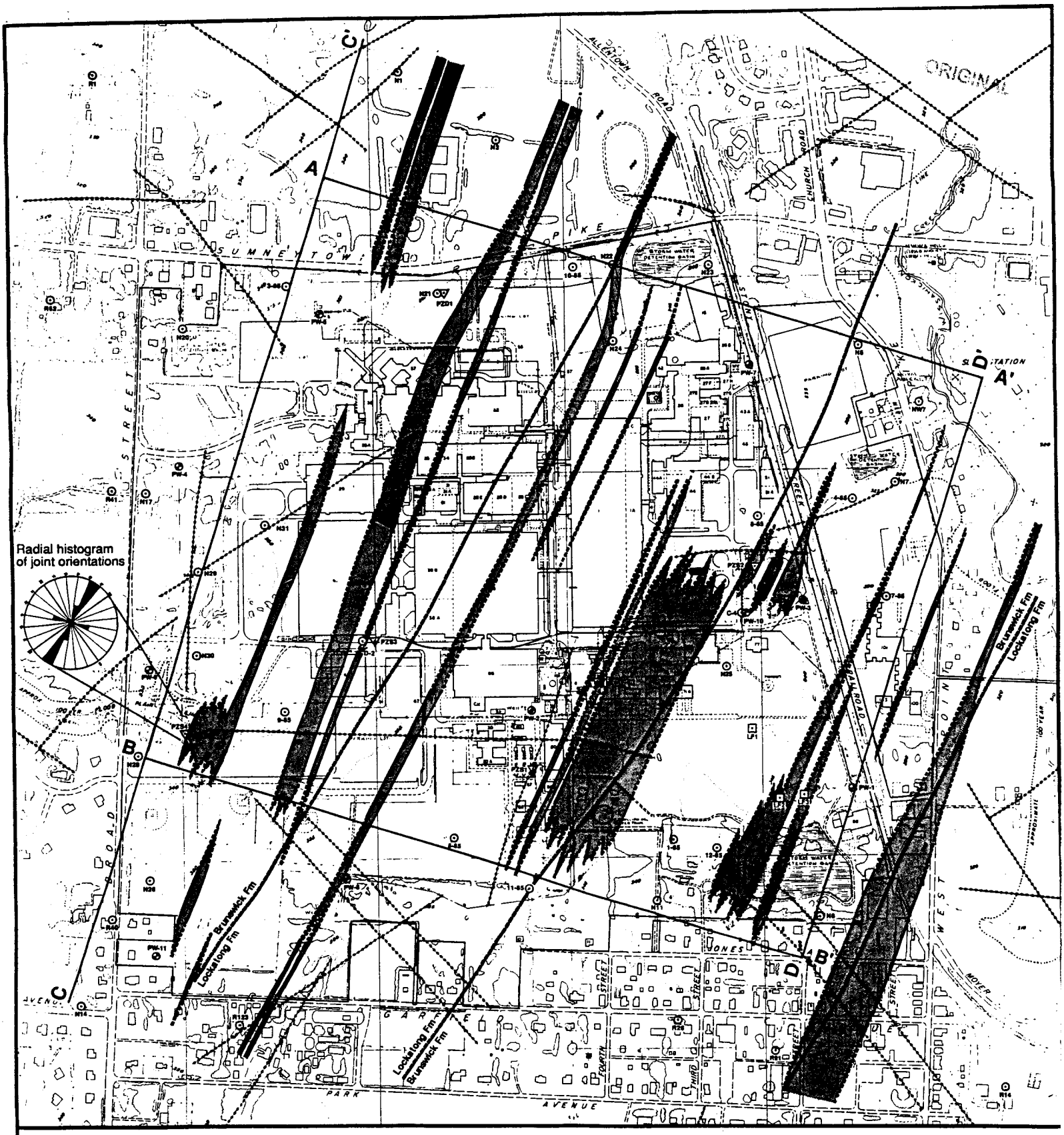
Site Location on Drainage Map

ORIGINAL



Site drainage map.


Merck
Brunswick Formation
Lockatong Formation
Lockatong Formation
Brunswick Formation
Brunswick Formation
Brunswick Formation
Lockatong Formation
Stockton Formation
LANSDALE
WEST NORRITON
EAST NORRITON
PLYMOUTH
Source: Longwill, S.M., and Wood, C.R., (1965)
0
1
2
Scale in Miles
N



A — A' Line of Cross Section

Gray Marker Beds
Solid lines indicate known contacts
Dashed lines indicate unknown contacts

Fracture Trace

Formation Contacts Mapped by Longwill and Wood (1965)
Note: Average bedrock strike is N57°
Average dip is 10°N

⊙ **N18** Monitoring Well

▽ **PZS4** Piezometer

⊡ **LF3** 4" Diameter Monitoring Well

⊕ **PW-9** Plant Production/Recovery Well

0 600'

Adapted from Merck & Co., Inc. Drawing E-22779-2

NITTANY GEOSCIENCE INC.

GEOLOGIC MAP

MERCK & CO., INC.
WEST POINT, PA

PREPARED BY: P.G.C.	DATE: 2/6/96	PLATE 1
CHECKED BY: W.F.E.	REVISED: 5/20/96	
DRAWN BY: S.C.L.	FIGURE NO: 000-M-FOS-1	

CBT ORIGINAL

Merck 104(e) response 8/5/86

- TCE use 1976 - 1984 per PPC plan

- TCE purchased 1979 385 gal in 55 g drums } qty unclear (45)
  - reagent grade
  - drummed
  1980 1100 gal "

- 1980 - TCE spill to sanitary sewer (~55 gal) (r.46)
  - other "very small" leaks also documented

- 1984 EPA Part B haz waste permit applic. granted
  1985 PADER permit for container storage + limited incineration recd.

- 1,1,1 TCA ("Chloroethene") also used (r. 84D)

  Qty ?

- TCA ~~DDD~~ (Chloroethene) + TCE stored in Bldg 38.